Transition	$\alpha=\mu_a\,(\mathrm{HDSe})/\mu_a\,(\mathrm{HDO})$
$2_{20}-2_{21}$	0,68±0,02
$4_{31}-4_{32}$	0,67±0,02
$7_{43}-7_{44}$	0,70±0,02
$9_{54}-9_{55}$	0,67±0,02
	$\alpha_{av}=0{,}68\pm0{,}02$

for these measurements was 2kv/cm. The resulting value of a is the ratio of the dipole components along the a axis for the molecules HDSe and HDO; values are given in the table. The total dipole moment of HDSe is associated with a by the simple expression

$$\mu\,(\mathrm{HDSe}) = \alpha\,\mu\,(\mathrm{HDO}) \sin\delta_2 / \sin\delta_1,$$

where μ(HDO) is the dipole moment of HDO and δ_1 and δ_2 are the angles between the a axis and the direction of the dipole moment for HDSe and HDO respectively. δ_1 is approximately 45°, and if we take $\delta_2 = 20°30'$ and $\mu(\mathrm{HDO}) = 1.84$ Debye units[4] we obtain 0.62 Debye units for the dipole moment of HDSe, which differs extremely from the value of 0.24 Debye units obtained in Ref 1.

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Second Relaxation in a Spin System at Room Temperature

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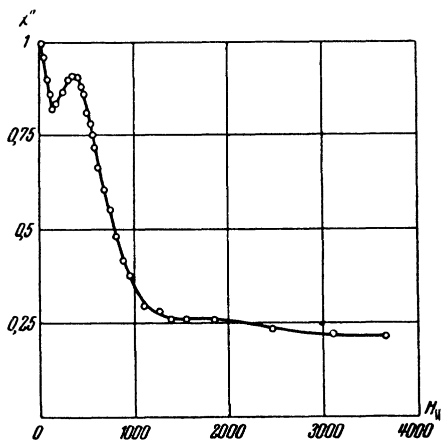
THE investigation of paramagnetic absorption in $Cr(NO_3)_3 \cdot 9H_2O$ in parallel fields at 300° K, employing Zavoiskii's grid current method[1], revealed an effect which is unusual at room temperature. The absorption $\chi''\,(H_\parallel)$ plotted in the figure for a 160 Mc oscillating field has quite a narrow peak. The right-hand half width was of the order of 300 oersteds. As ν increases the absorption peak is shifted in the direction of higher constant magnetic field strengths; this is shown in the following set of data:

ν in Mc =	48	93	131	160
Magnetic field in oersteds at peak =	250	290	330	360



The intensity of the absorption peak compared with absorption at $H=0$ diminishes with increasing frequency from 10 to 160 Mc. At frequencies of the order of 660 Mc, the shape of the paramagnetic absorption curve differs very little from the usual $\chi''\,(H_\parallel)$ curve which is described by Shaposhnikov's formula[2] $\chi'' = (1-F)^2\,\rho_s\nu$.

Below 10 Mc, spin-lattice relaxation influences the absorption curve so strongly that a peak is hardly discernible.

This phenomenon is apparently associated with the new form of spin-spin relaxation discovered by DeVrijer and Gorter[3,4] in potassium chrome alum at the temperature of liquid hydrogen. Gorter and his associates[5] later detected this type of relaxation in a number of other materials but again only at very low temperatures. So far as we know the effect has not previously been observed at room temperature.

At the present time the author is using the grid current method in similar investigations of other chromium salts and salts of Mn^{++}, Cu^{++} and Fe^{+++}.

In conclusion I take this opportunity to thank B. M. Kozyrev for guidance and constant assistance.

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Electric Monopole Transitions in Nuclei with Odd Mass Numbers

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THE non-radiative wholly converted electric monopole $E0$ transitions between two spin zero levels ($0+ \to 0+$) have been studied well enough only in three cases (see Table 1). However, $E0$ transitions can take place not only between 0-0 levels, but between any two levels with same spin and parity, because in this case the selection rules are satisfied ($\Delta I = 0$, no). The matrix element for an $E0$-transition has the form

$$H_{if} = \langle f \left| \sum_p r_p^2 \right| i \rangle = \rho R_0^2, \tag{1}$$

where R_0 is the nuclear radius and ρ a parameter, which is of the order of unity in the case of a complete overlapping of the initial and final state wave functions. The monopole transitions, more than the others, depend on the structure of the nucleus; their study can therefore give additional information on nuclear models.

An attempt has recently been made[2] to observe $E0$-transitions between two levels $2 \to 2$ in even-even nuclei. If one measures the internal conversion coefficient (ICC) for the K-shell, α_k and, by an independent method (e.g., from angular correlation), determines the contribution to the radiation of $M1$ and $E2$-transitions, then

$$\alpha_k = T_e / T_\gamma = \varkappa \alpha_2 + (1 + \varkappa) \beta_1 + T_{e0} / T_\gamma. \tag{2}$$

α_2 and β_1 are the theoretical ICC's for $E2$ and $M1$-transitions respectively, κ is the contribution of $E2$ transition, T_γ is the probability of γ-transition equal to $T_\gamma(M1) + T_\gamma(E2)$ and T_e is the conversion probability. The third term T_{e0}/T_γ determines the part of the electrons involved in the monopole transition.

It follows from the experimental values of the ICC for the $2+ \to 2+$ transitions in Pt^{192}, Pt^{196} and Hg^{198} nuclei, that the part T_{e0}/T_γ is very small and lies within the limits of the experimental errors; theoretical considerations[2] indicate that this part should be of the order of unity. Such a result has been understood after it has been determined that the spin 2 levels in the considered nuclei have a vibrational character, and that the transitions between them involve a change by unity of the vibrational quantum number ν. This strongly forbids $E0$-transitions and reduces their probability by a factor of about 100. The investigation of $E0$-transitions between levels of other type is made difficult by the necessity of independent measurements of the ICC and of the percentage of $E2$ (or $M1$) transitions, which is a very difficult experimental problem at the present time.

The purpose of the present note is to point out the existence of $E0$-transitions between spin $\frac{1}{2}$ levels ($\frac{1}{2} \pm \to \frac{1}{2} \pm$) in odd A nuclei. In this case, the spin selection rules rule out the possibility of $E2$-transitions ($\kappa = 0$) and Eq. (2) becomes:

$$T_{e0} / T_\gamma = \alpha_k - \beta_1. \tag{3}$$

This simplifies the experimental method a great deal, because it suffices to measure only the ICC α_K.